

Single Molecule Instrument for Surface Enhanced Raman Optical Activity of Biomolecules, Phase II

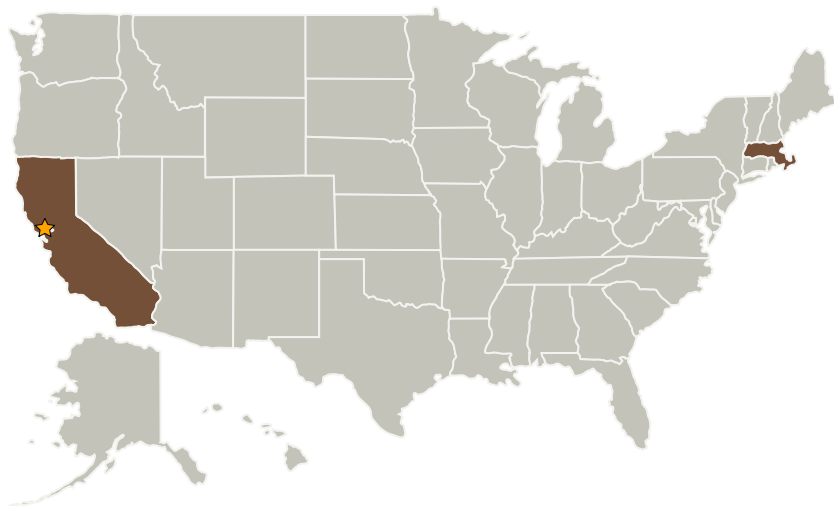
Completed Technology Project (2006 - 2008)



Project Introduction

Stereochemistry is an essential element of our organic life. Only certain enantiomers are useful as drugs for the human body. Raman optical activity (ROA) provides stereochemical information down to the bond levels. Many biomolecules like proteins and DNA can be studied to understand their structural chemistry and structure related dynamics. These methods do not require material in the crystalline form and hence can be very useful tools. However, ROA signals are even weaker than the Raman signals. Using an important biomolecule, we have demonstrated in Phase I that ROA can be enhanced using nanoparticles. Not only did the ROA ratio increase by two orders of magnitude, the measurement time reduced from several hours to 10 seconds. Phase II work will focus on enhancing ROA signals in different subspecies of biomolecules, namely amino acids and proteins, and developing the appropriate colloidal chemistry. Use of nanoparticles is known to enhance Raman signals by several orders of magnitude. Our goal is to achieve similar gains in ROA signals by using a sensitive detection system in combination with improved surface enhanced chemistry and microfluidics-based single-molecule detection techniques. This will result in improved precision of measurement and shorten measurement time.

Primary U.S. Work Locations and Key Partners



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Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Areas	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Radiation Monitoring Devices, Inc.	Supporting Organization	Industry	Watertown, Massachusetts

Primary U.S. Work Locations

California	Massachusetts
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.3 In-Situ Instruments and Sensors
 - └ TX08.3.2 Atomic and Molecular Species Assessment